

Weather and Climate Summary and Forecast

January 2019 Report

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Summary:

- December was mild and dry over much of the west, while the east was much warmer than average.
- The winter rain deficits are adding up for the majority of the western US contributing to ongoing drought concerns, especially in the PNW.
- The seasonal forecast for January through March continues to reflect the influences of a weak to moderate El Niño in the Tropical Pacific and a warm North Pacific. As such the odds continue to be tilted toward a warmer and near average to drier than average winter across the PNW and northern tier of states and near average temperatures and wetter than average conditions across the southern tier of states.

December continued the relatively mild conditions seen in November across the western US. The warmest conditions were seen across Washington, the northern Rockies and the Great Plains where temperatures were 1-6°F above normal (Figure 1). Portions of southern and eastern Oregon, northern California, and the northern Great Basin were closer to average or slightly cooler than average for the month, while much of the rest of the west was 1-2°F above normal. Except for northern New England and south Florida, the rest of the country was much warmer than average (not shown). Winter season precipitation continues to disappoint with a December that was largely drier than average across the west (Figure 1). The Rockies, southwest and much of California saw precipitation amounts that ranged from 20-90% of normal, while much of Washington, portions of north-central Nevada and extreme southern California saw above average precipitation for the month. Much of the rest of the country saw substantially wetter than average conditions with Texas north to the Canadian border and nearly all of the southeast seeing 130-300% of normal. Only the Great Lakes and northern New England saw near normal precipitation for the month (not shown).

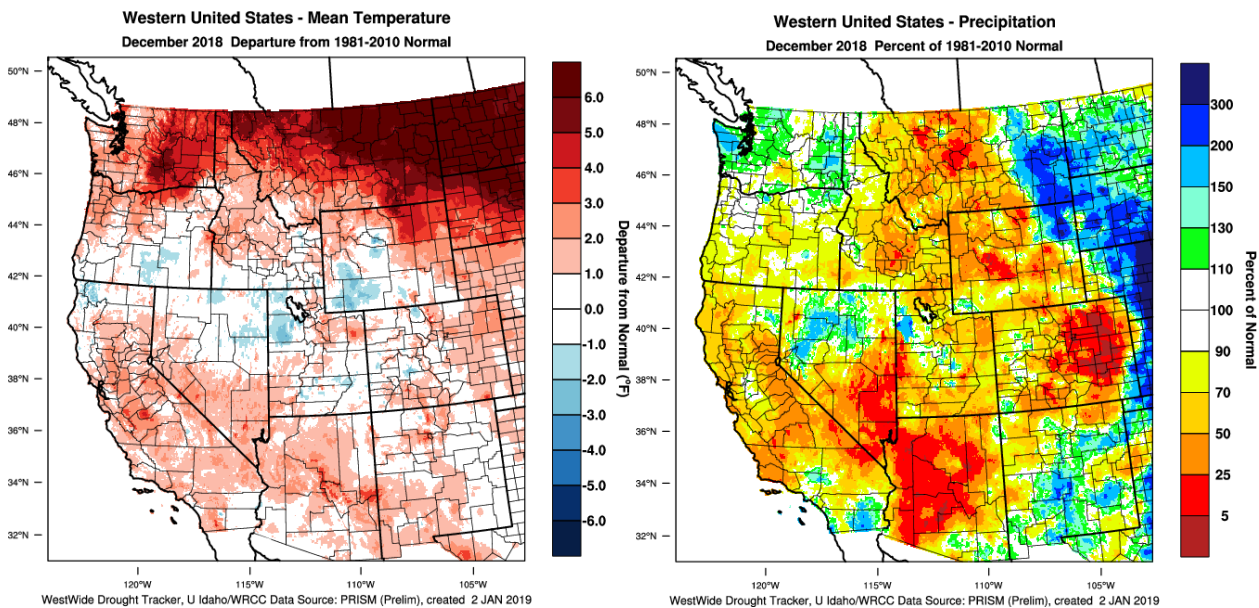


Figure 1 – Western US December 2018 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

With 2018 behind us we can now summarize the year: temperatures were largely warmer than average (0.5 to 3.0°F) and precipitation was largely below average throughout the western US (Figure 2). There was also a striking transition to cooler and wetter than average east of the Rockies (Figure 2). The northern Plains and western Great Lakes south into Oklahoma ended up having a cooler than average year (1-3°F below normal; not shown) while near normal temperatures in eastern Texas and the Mississippi river valley transitioned to a warmer than average

southeast and east coast (not shown). While the west was dry in 2018 (mostly 40-90% of normal; Figure 2), the eastern US saw precipitation amounts that ran 110-175% of normal (not shown). The driest regions in the US for 2018 were Southern California across into the desert southwest and Four Corners region where 40-60% of normal was recorded (see the Drought Monitor below).

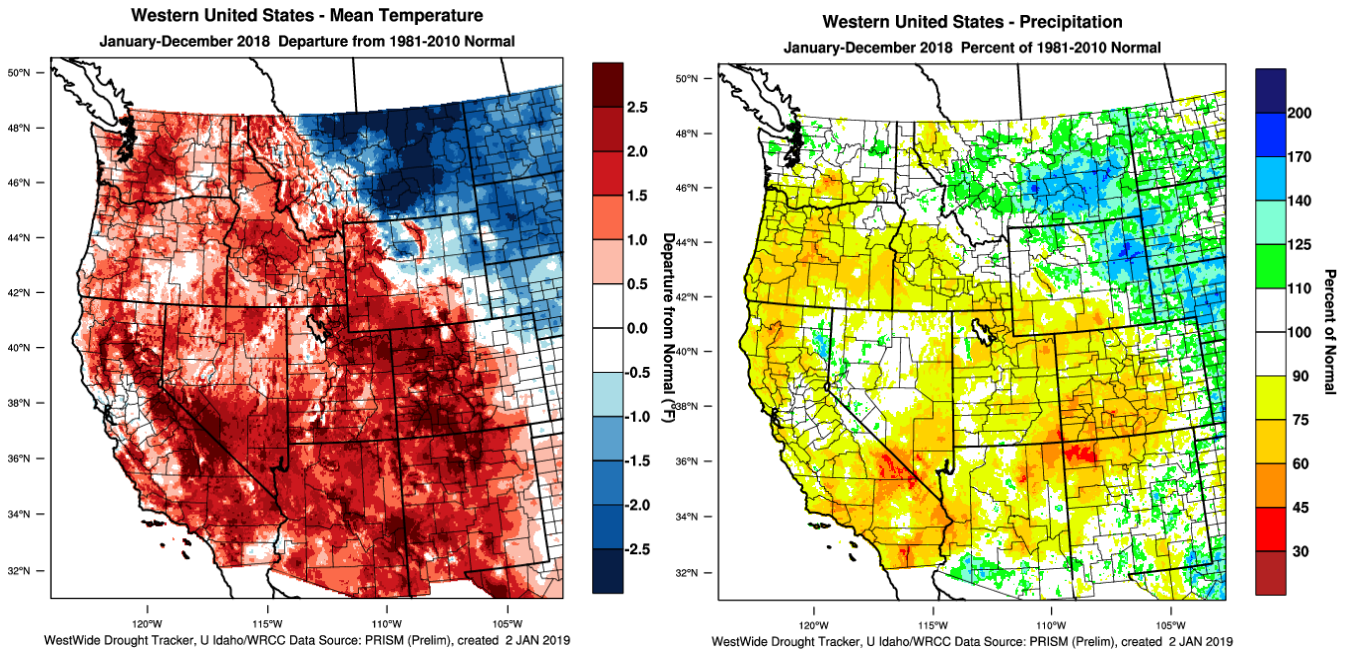


Figure 2 – Western US complete 2018 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Drought Watch – Some precipitation relief in isolated areas but unfortunately the overall dry conditions for the vast majority of the western US are continuing (Figure 3, left panel). The current US Drought Monitor shows that the drought footprint has continued its decline as much of the central to the eastern US has received enough precipitation to have no widespread drought. However, the western US continues to see drought conditions with the main areas of severe to extreme drought over the Four Corners region and the desert southwest with further increases in severity seen in Oregon. The longer-term outlook for the US through March shows some changes, especially in central to southern California and portions of the Great Basin where these areas will likely see some improvement or complete drought removal over the next three months. However, much of the long-term persistent drought seen in eastern

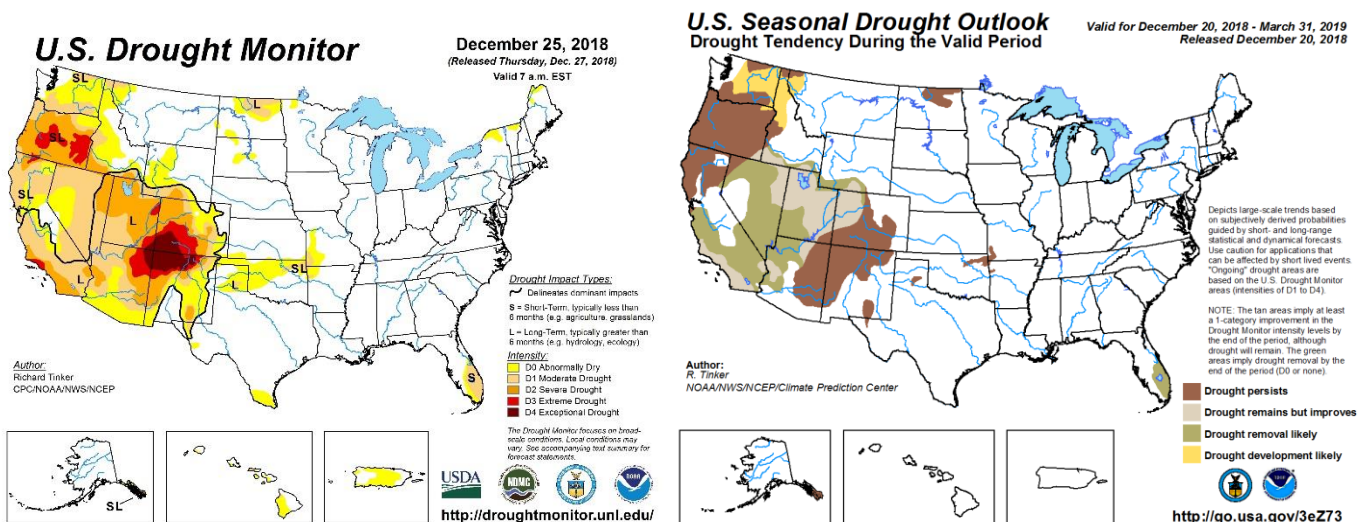


Figure 3 – Current US Drought Monitor and seasonal drought outlook.

Oregon is being forecast to expand to cover the whole state of Oregon, much of northern California, eastern Washington, and northern Idaho (Figure 3, right panel). The eastern half of the US is largely free of any current or ongoing drought conditions.

ENSO Watch – El Niño conditions continue with warming in east-central tropical Pacific SSTs (Figure 4). El Niño-level SSTs continued to be observed in the November to December SST averages, and the subsurface waters continued to be warmer than average. However, most atmospheric variables continued to show ENSO-neutral patterns. The official CPC/IRI outlook calls for a 95% chance of El Niño prevailing during the rest of the winter, and 70% during March-May 2019. As such the CPC has indicated that an El Niño watch is in effect. The most recent forecasts of statistical and dynamical models collectively show continuing El Niño-level SSTs, most likely weak to moderate in strength, continuing as a weak event through spring and even into summer. If the El Niño conditions continue to hold, the weather across the western US will likely continue to follow the warmer and drier than average conditions in the 90-day forecast (especially in the PNW) and beyond (see forecast periods below and Appendix Figure 1). Areas from southern California across the south and into the mid-Atlantic will likely see a wetter than average winter and early spring.

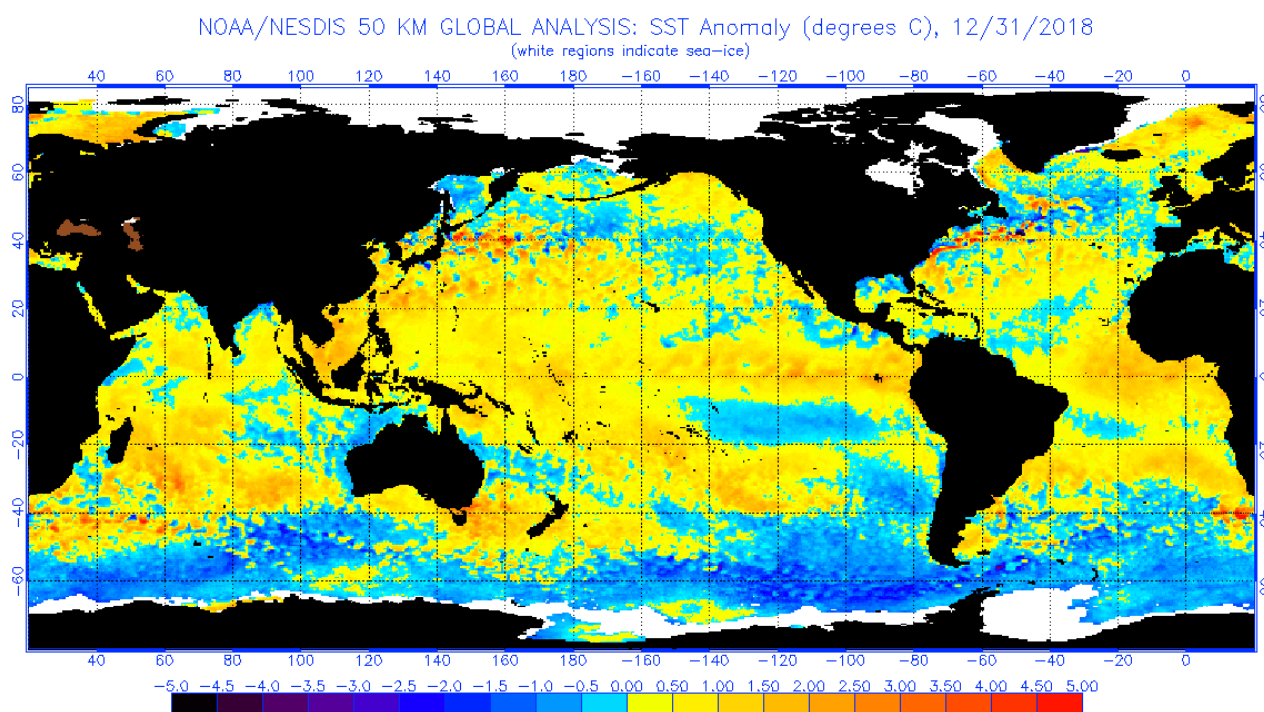


Figure 4 – Global sea surface temperatures (°C) for the period ending December 31, 2018 (image from NOAA/NESDIS).

North Pacific Watch – Minor changes in the North Pacific and the Gulf of Alaska with some cooling in the gulf and spotty cooler surface waters across the basin (Figure 4). However, the upper 300ft of the North Pacific Ocean north of 40°N remains warmer than normal (1980-present). The current North Pacific sea surface temperatures (SSTs) combined with the El Niño in the tropics have had a moderate to strong influence over current winter conditions, but the spatial pattern is not quite what we saw with the ‘Blob’ in 2012-2016 as the bulk of the warmth continues to be a little further to the west (Figure 4). Regional forecasting agencies are saying that the warming North Pacific will likely continue to interact with the warming Tropical Pacific (see above) to enhance the normal weather/climate patterns in the west during El Niño years (see the JFM forecast below).

Forecast Periods:

6-10 Day (valid January 8-12): Current conditions are favoring a colder than average first week of the month, however the forecast into the second week is favoring a warmer than average western US that extends across much

of the rest of the country. Much of the Great Plains, Great Lakes, Midwest, and Southeast is forecast to be much warmer than average over the short-term while there is a transition to a forecast of near average to cooler than average in northern New England. In terms of precipitation, the PNW is forecast to be slightly wetter than average while central to southern California across to the Midwest is forecast to have a much greater chance of seeing above average precipitation for this period. The northern Great Plains and Rockies along with the Southeast and Florida are forecast to see below average precipitation during this period.

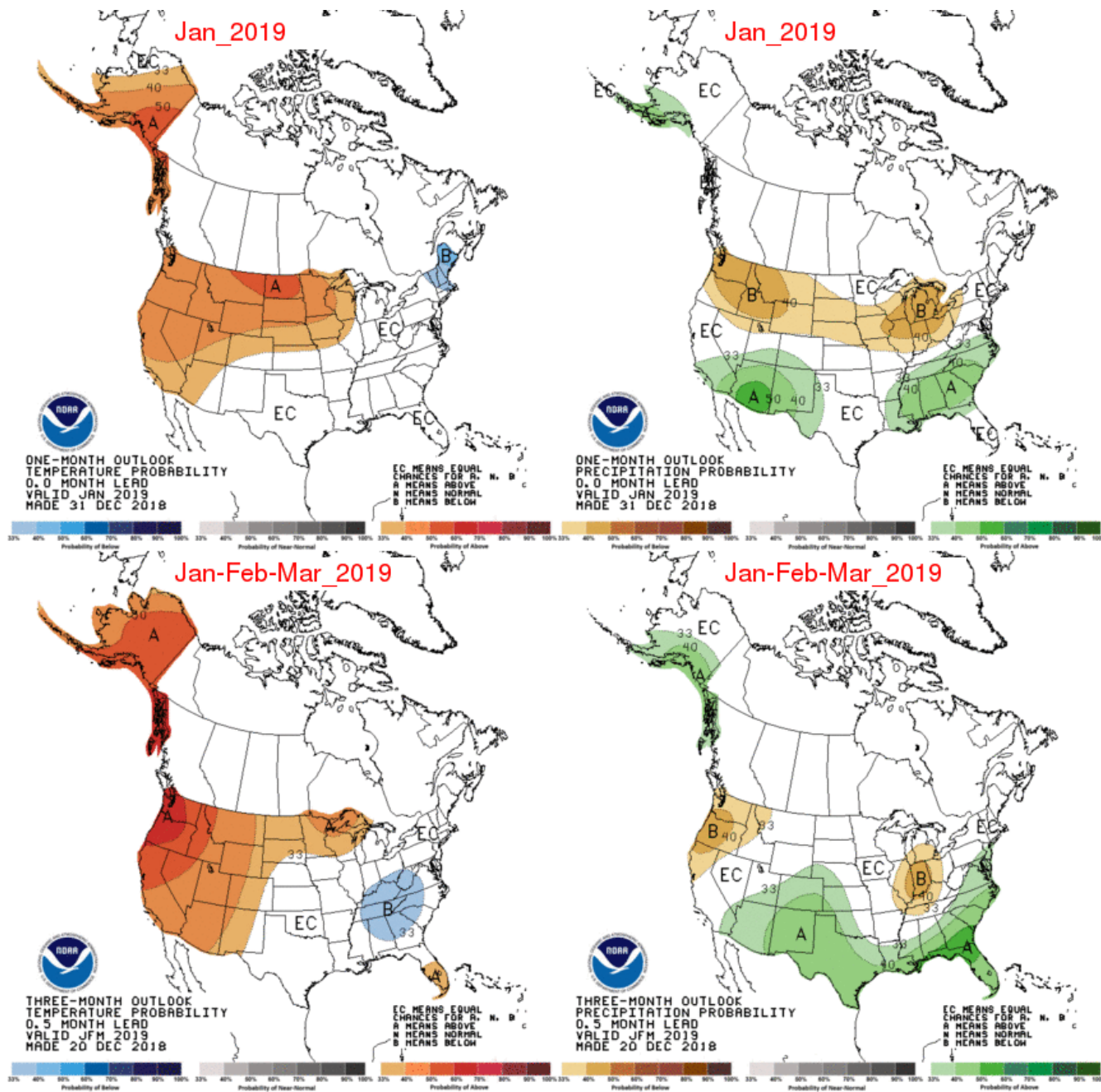
8-14 Day (valid January 10-16): The general pattern from the 6-10 day forecast continues with the exception that the northern portion of the Great Basin and the northern Rockies are forecast to likely have near normal temperatures. The rest of the country has a high probability to see above normal temperatures for mid-January, except northern New England which should be near average. Moving into mid-month the PNW and northern Rockies are forecast to have near normal to lower than normal precipitation while the southern and central portion of the country across to the Great Lakes is likely to be wetter than normal. The southeast and eastern seaboard are forecast to be near normal to below normal during mid-month.

30 Day (valid January 1-31): The 30-day lead forecast for the month of January is pointing to warmer than average conditions across the western US through the Rockies and into the northern Plains. The bulk of the rest of the country is forecast to have an equal chance of above, normal or below normal temperatures for the month. The January precipitation forecast is tilting the odds to a general north-south, drier-wetter than average month across the country. The PNW is forecast to likely be below normal for January precipitation, while central California is forecast to be near normal and the Southwest likely to be above normal.

90 Day (valid January-February-March): The extended forecast through March continues to hold from prior months and continues to be largely based on the El Niño in the Tropical Pacific (see above). Conditions normally seen during El Niño winters, and reflected in the JFM forecast, are a warmer than average PNW and Alaska. The forecast shows the probability of being warmer than average mostly confined to the western US and into the northern Plains and Great Lakes, while the rest of the country is expected to see closer to average or slightly below average temperatures during JFM (see Appendix Figure 1). In terms of precipitation, the PNW and the Ohio River Valley are forecasted to see below average accumulation during the three-month period while the southern portions of the country from southern California to the mid-Atlantic are forecasted to see wetter than average conditions. Everywhere in between has an equal chance of being above, normal, or below average in terms of precipitation.

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Appendix Figure 1 – Temperature (left panel) and precipitation (right panel) outlooks for the month of January (top panel) and January, February, and March (bottom panel) (Climate Prediction Center, climate.gov).